

CLAIMS

1 1. A method for performing time-domain equalization of an information
2 signal represented by an optical signal, said method comprising:
3 receiving the optical signal;
4 optically splitting the optical signal into beams;
5 optically delaying at least one of the beams;
6 detecting a plurality of the beams to generate respective electrical signal
7 components; and
8 combining a plurality of the electrical signal components to generate an
9 electrical output signal representing the information signal.

1 2. The method of claim 1, further comprising:
2 optically scaling at least one of the beams.

1 3. The method of claim 2, wherein, in detecting the plurality of the
2 beams, at least one of the beams detected has not been subjected to at least one of (a)
3 the delaying, and (b) the scaling.

1 4. The method of claim 1, further comprising:
2 electrically scaling at least one of the electrical signal components.

1 5. The method of claim 1, wherein optically splitting the optical signal
2 includes:
3 providing a beamsplitter; and
4 performing the splitting using the beamsplitter.

1 6. The method of claim 1, wherein optically splitting the optical signal
2 includes:
3 providing a diffractive optical element; and
4 performing the splitting using the diffractive optical element.

1 7. The method of claim 2, further comprising:
2 providing a diffractive optical element; and
3 performing the splitting and the scaling using the diffractive optical element.

1 8. The method of claim 1, wherein:
2 in optically delaying at least one of the beams, the at least one of the beams is
3 delayed relative to at least one other of the beams; and
4 optically delaying at least one of the beams includes:
5 providing a first optical path and a second optical path;
6 directing the at least one of the beams via the first optical path; and
7 directing the at least one other of the beams via the second optical path.

1 9. The method of claim 8, wherein the first optical path is physically
2 longer than the second optical path.

1 10. The method of claim 8, wherein:
2 each of the first optical path and the second optical path is defined, at least in
3 part, by an optical transmission medium having an effective refractive index; and
4 the effective refractive index of the optical transmission medium of the first
5 optical path is greater than the effective refractive index of the optical transmission
6 medium of the second optical path.

1 11. The method of claim 1, wherein, in optically delaying at least one of
2 the beams, each of the beams is delayed relative to every other of the beams.

1 12. The method of claim 1, wherein, in combining the plurality of
2 electrical signal components, at least one of the electrical signal components is
3 summed negatively.

1 13. The method of claim 2, wherein, in scaling at least one of the beams,
2 the at least one of the beams is optically attenuated relative to at least one other of the
3 beams.

1 14. The method of claim 1, further comprising:
2 optically dividing each of the beams into a first sub-beam and a second sub-
3 beam having an intensity ratio; and
4 wherein detecting a plurality of the beams includes detecting the first sub-
5 beams to generate respective first electrical signal sub-components and detecting the
6 second sub-beams to generate respective second electrical signal sub-components; and
7 wherein combining the plurality of electrical signal components includes
8 summing the first and second electrical signal sub-components to generate the
9 electrical output signal.

1 15. The method of claim 14, wherein combining the plurality of electrical
2 signal components includes:
3 summing the first electrical signal sub-components to generate a first electrical
4 signal;
5 summing the second electrical signal sub-components to generate a second
6 electrical signal; and
7 subtracting the first electrical signal from the second electrical signal to
8 generate the electrical output signal.

1 16. The method of claim 14, wherein combining the plurality of electrical
2 signal components includes:
3 subtracting each of the first electrical signal sub-components from a
4 corresponding one of the second electrical signal sub-components to generate a
5 respective one of the electrical signal components; and
6 summing the electrical signal components to generate the electrical output
7 signal.

1 17. The method of claim 14, further comprising:
2 providing a splitter; and
3 performing the splitting and the dividing using the splitter.

1 18. The method of claim 14, wherein optically scaling at least one of the
2 beams includes attenuating at least one of the first sub-beam and the second sub-beam
3 of the at least one of the beams to set the intensity ratio.

1 19. The method of claim 14, wherein optically dividing each of the
2 plurality of beams includes:
3 providing a polarization-dispersive device;
4 passing each of the plurality of beams through the polarization-dispersive
5 device to separate the beams into the respective first sub-beam and second sub-beam;
6 and
7 rotating a polarization direction of at least one of the plurality of the beams to
8 set the intensity ratio of the respective first sub-beam and second sub-beam.

1 20. A system for performing time-domain equalization of an information
2 signal represented by an optical signal, said system comprising:
3 means for receiving the optical signal;
4 means for optically splitting the optical signal into beams;
5 means for optically delaying at least one of the beams;
6 means for detecting a plurality of the beams to generate respective electrical
7 signal components; and
8 means for combining plurality of the electrical signal components to generate
9 an electrical output signal representing the information signal.

1 21. The system of claim 20, further comprising:
2 means for optically dividing each of the beams into a first sub-beam and a
3 second sub-beam having an intensity ratio; and
4 wherein said means for detecting a plurality of the beams includes means for
5 detecting the first sub-beams to generate respective first electrical signal sub-
6 components and means for detecting the second sub-beams to generate respective
7 second electrical signal sub-components; and
8 wherein said means for combining the plurality of electrical signal components
9 includes means for summing the first and second electrical signal sub-components to
10 generate the electrical output signal.

1 22. The system of claim 21, wherein said means for combining the
2 plurality of electrical signal components includes:
3 means for summing the first electrical signal sub-components to generate a
4 first electrical signal;
5 means for summing the second electrical signal sub-components to generate a
6 second electrical signal; and
7 means for subtracting the first electrical signal from the second electrical
8 signal to generate the electrical output signal.

1 23. The system of claim 20, further comprising:
2 means for optically scaling at least one of the beams.

1 24. The system of claim 20, further comprising:
2 means for electrically scaling at least one of the beams.

1 25. A system for performing time-domain equalization of an information
2 signal represented by an optical signal, said system comprising:
3 a beamsplitter adapted to split the optical signal optically into beams;
4 a delay component optically communicating with the beamsplitter, the delay
5 component being configured to receive at least one of the beams and delay the at least
6 one of the beams optically;
7 an array of photodetectors arranged to receive the at least one of the beams, the
8 array of photodetectors being adapted to generate respective electrical signal
9 components corresponding to the at least one of the beams; and
10 an amplifier arranged to receive the electrical signal components, the amplifier
11 being adapted to generate an electrical output signal representing the information
12 signal.

1 26. The system of claim 25, further comprising:
2 an attenuator optically communicating with the delay component and the
3 array of photodetectors, the attenuator being configured to scale at least one of the
4 beams and provide the at least one of the beams to the array of photodetectors after
5 scaling.

- 1 27. The system of claim 25, further comprising:
2 an attenuator electrically communicating with the array of photodetectors and
3 the amplifier, the attenuator being configured to scale at least one of the electrical
4 signal components and provide the at least one of the electrical signal components to
5 the amplifier after scaling.